

## CLAIMS

What is claimed is:

*Sub A'* > 1. A subscriber unit implementing physical layer automatic repeat request, comprising:

a transmitter having:

a physical layer transmitter for receiving data, formatting the received data into packets, each packet having a particular encoding/data modulation, transmitting the packets, and retransmitting packets in response to failure to receive a corresponding acknowledgment for a given packet;

an acknowledgment receiver for receiving the corresponding acknowledgment;

and

an adaptive modulation and coding controller for collecting retransmission statistics and adjusting the particular data encoding/modulation using the collected statistics; and

a receiver having:

a physical layer receiver for demodulating the packets;

a combiner/decoder for buffering, decoding and detecting packet errors; and

an acknowledgment generator for generating an acknowledgment for each packet if that packet has an acceptable error rate.

2. The subscriber unit of claim 1 wherein the particular encoding/data modulation is forward error correction (FEC).

3. The subscriber unit of claim 2 wherein the packets are transmitted using an orthogonal frequency division multiple access (OFDMA) air interface and the FEC encoding/data modulation adjusting is performed in addition to selective nulling of subchannels in an OFDMA set.

4. The subscriber unit of claim 1 wherein the packets are transmitted using a single carrier having a frequency domain equalization (SC-FDE) air interface.

5. The subscriber unit of claim 1 whereby the subscriber unit uses a code division multiple access (CDMA) air interface and wherein the acknowledgments are transmitted on a fast feedback channel.

6. The subscriber unit of claim 1 whereby the acknowledgment generator transmits a negative acknowledgment if any packet has an unacceptable error rate.

7. Physical automatic request repeat apparatus employed by a subscriber unit, comprising:

a transmitter having:

means for receiving data;

means for formatting the received data into packets for transmission, each packet having a particular encoding/data modulation;

means for transmitting the packets;

means for retransmitting a packet, if an acknowledgment for that packet is not received;

means for collecting retransmission statistics; and

means for adjusting each particular data modulation using the collected retransmission statistics; and

a receiver having:

means for receiving packets;

means for decoding and error checking each received packet; and

means for generating an acknowledgment at the physical layer if that received packet has an acceptable error rate.

8. The subscriber unit apparatus of claim 7 wherein the particular encoding/data modulation is forward error correction (FEC).

9. The subscriber unit apparatus of claim 7 wherein the packets are transmitted using an orthogonal frequency division multiple access (OFDMA) air interface and the FEC encoding/data modulation adjusting is performed in addition to selective nulling of subchannels in an OFDMA set.

10. The subscriber unit apparatus of claim 7 wherein the packets are transmitted using a single carrier having frequency domain equalization (SC-FDE) air interface.

11. The subscriber unit apparatus of claim 7 wherein the acknowledgments are transmitted using a code division multiple access (CDMA) air interface on a fast feedback channel.

12. The subscriber unit apparatus of claim 7 whereby said means for generating generates a negative acknowledgment if a packet has an unacceptable error rate.

13. A subscriber unit for supporting broadband wireless communications comprising:

a sequencer having a queue for receiving data blocks from a communication network and for sequentially conveying packets to n transmitters;

n transmitters for transmitting said packets through a data channel;

n receivers for receiving return packets through said data channel; and

n hybrid ARQ decoders, each coupled with one of said n receivers;

whereby said n hybrid ARQ decoders have a feedback channel for transmitting an acknowledgment when a packet having an acceptable error rate has been received, and for releasing packets which have an acceptable error rate.

14. The subscriber unit of claim 13 wherein said n signal transmitters each temporarily store a packet that has been transmitted in a buffer memory; whereby each of said n transmitters clear the stored packet in readiness for receipt of another block when an acknowledgement signal for the stored packet has been received at one of said n receivers.

15. The subscriber unit of claim 13 wherein said n transmitters each temporarily store a packet that has been transmitted in a buffer memory; whereby said n transmitters retransmits the packet temporarily stored in its buffer memory when an acknowledgement signal for the stored packet has not been received at one of said n receivers.

16. The subscriber unit of claim 13 wherein each of said n transmitters clears its buffer memory if an acknowledgement signal is not received after a maximum number of retransmissions.

17. The subscriber unit of claim 16 wherein the maximum number of retransmissions is an operator defined integer having a range from 1 to 8.

18. The subscriber unit of claim 13 wherein each of said n receivers combine a retransmitted packet with an original transmitted packet to facilitate error correction.

19. The subscriber unit of claim 13 wherein a transmitter failing to receive an acknowledge signal encodes the packet by employing a different encoding technique from an encoding technique employed in an original transmission of that packet.

20. The subscriber unit of claim 13 wherein each of the n transmitters employs turbo coding and each of the n decoders employ code combining of an original transmission and a retransmission to facilitate error correction.

21. The subscriber unit of claim 13 wherein the packets are transmitted using an orthogonal frequency division multiple access (OFDMA) air interface in which frequency subchannels in an OFDMA set may be selectively nulled.

22. The subscriber unit of claim 13 wherein the packets are transmitted using a single carrier having a frequency domain equalization (SC-FDE) air interface.

23. The subscriber unit of claim 13 wherein the acknowledgments are transmitted on a fast feedback channel using a code division multiple access (CDMA) air interface.